WHAT IS CLAIMED IS:

1. A pharmaceutical composition comprising a molecule comprising a fucose group in an α1,2 linkage, an α1,3 linkage or an α1,4 linkage to a galactose group and a pharmaceutically acceptable carrier.

2. The composition of claim 1 where in the fucose is contained within an LNF-I group, an 2'FL group, an LNF-I group, an LNF-II group, an 3'FL group, an LNF-III group, an LDFH-I group, a LDFT group or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc.

3. The composition of any of the forgoing claims wherein the molecule is a glycan, a glycolipid, a glycoprotein, a glycosaminoglycan or a mucin.

4. The composition of any of the forgoing claims wherein the molecule comprises at least two different groups selected from an LNF-I group, an 2'FL group, an LNF-I group, an LNF-II group, an 3'FL group, an LNF-III group, an LDFH-I group, a LDFT group or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc.

5. The composition of any of the forgoing claims wherein the molecule comprises at least three different groups selected from an LNF-I group, an 2'FL group, an LNF-I group, an LNF-II group, an 3'FL group, an LNF-III group, an LDFH-I group, a LDFT group or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc.

6. The composition of any of the forgoing claims wherein the molecule contains at least 5 groups selected from an LNF-I group, an 2'FL group, an LNF-I group, an LNF-II group, an 3'FL group, an LNF-III group, an LDFH-I group, a LDFT group or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc.

7. The composition of any of the forgoing claims wherein the groups are covalently linked to a protein in an O-link to Ser or Thr or an N-link to Asn.

8. The composition of any of the forgoing claims wherein the composition does not contain a mammalian milk.

9. The composition of any of the forgoing claims wherein the composition does not contain human milk

10. A pharmaceutical composition comprising a purified protein modified to include at least two different groups selected from:

2'-Fucosyllactose;
Lacto-N-fucopentaose I;
Lacto-N-fucopentaose II;
3'-Fucosyllactose;
Lacto-N-fucopentaose II;
Lacto-N-difucohexaose I;
Lactodifucotetraose;
LactoN-tetraose;
LactoN-neotetraose;
3'-Sialyllactose;
3'-Sialyllactosamine;
6'-Sialyllactose;
6'-Sialyllactosamine;
Sialyllacto-N-neotetraose c;
Monosialyllacto-N-hexaose;
Disialyllacto-N-hexaose I;
Monosialyllacto-N-neohexaose I;
Monosialyllacto-N-neohexaose II
Disialyllacto-N-neohexaose
Disialyllacto-N-tetraose;
Disialyllacto -N-hexaose II;
Sialyllacto-N-tetraose a;

Disialyllacto-N-hexaose I;

Sialyllacto-N-tetraose b;

3'-Sialyl-3-fucosyllactose;

Disialomonofucosyllacto-N-neohexaose;

Monofucosylmonosialyllacto-N-octaose (sialyl Lea);

Sialyllacto-N-fucohexaose II;

Disialyllacto-N-fucopentaose II;

Monofucosyldisialyllacto-N-tetraose, or a variant thereof wherein Glc at the reducing end is replaced with GlcNAc.

11. A pharmaceutical composition comprising a purified protein modified to include at least two different groups selected from:

2-Fucosyllactose;

Lacto-N-fucopentaose I;

Lacto-N-fucopentaose II;

3-Fucosyllactose;

Lacto-N-fucopentaose II;

Lacto-N-difucohexaose I;

Lactodifucotetraose; or a variant thereof wherein Glc at the reducing end is replaced with GlcNAc.

12. The composition of any of claims 10-11 wherein the protein is modified to contain multiple copies of each of the at least two different groups.

13. The composition of any of claims 10-12 wherein the protein is a human milk protein.

14. The composition of claims 10-13 wherein the human milk protein is selected from: κ-casein, α-lactalbumin, lactoferrin, bile salt-stimulated lipase, lysozyme, serum

albumin, folate-binding protein, haptocorrin, lipoprotein lipase, glycosaminoglycan, mucin, lactoperoxidase, and amylase.

15. The composition of any of the forgoing claims which is a synthetic composition.

16. The composition of any of the forgoing claims which is not mammalian milk.

17. The composition of any of the forgoing claims further comprising at least one vitamin.

118. The composition of any of the forgoing claims further comprising at least one mineral.

19. The composition of of any of the forgoing claims further comprising at least one edible fat.

20. A pharmaceutical composition comprising a purified protein modified to include at least two different groups selected from:

2'-Fucosyllactose;

Lacto-N-fucopentaose I;

Lacto-N-fucopentaose II;

3'-Fucosyllactose;

Lacto-N-fucopentaose II;

Lacto-N-difucohexaose I;

Lactodifucotetraose;

2'-FLNac, or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc;

wherein the protein is not modified to contain any other oligosaccarides.

21. A synthetic nutritional composition comprising a glycan, a glycolipid, a glycoprotein, a glycosaminoglycan or a mucin that comprises at least two different groups selected from an LNF-I group, and 2'FL group, an LDFH-I group and a LDFT group or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc.

22. The synthetic nutritional composition of claim 21 wherein the molecule comprises at least three different groups selected from an LNF-I group, and 2'FL group, an LDFH-I group and a LDFT group or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc.

23. The synthetic nutritional composition of any of claims 21-22 wherein the molecule contains multiple copies of each of the at least two different groups.

24. The synthetic nutritional composition of any claims 21-23 wherein the molecule contains at least two copies of each of the at least two different groups.

25. The synthetic nutritional composition of any of claims 21-24 wherein the molecule contains at least five copies of each of the at least two different groups.

26. The synthetic nutritional composition of any claims 21-25 wherein the molecule contains at least ten copies of each of the at least two different groups.

27. The synthetic nutritional composition of any claims 21-26 wherein the molecule contains at least 20 copies of each of the at least two different groups.

28. A synthetic nutrition composition comprising a purified protein modified to include a group selected from: a Lacto-N-fucopentaose I group, a Lacto-N-fucopentaose II group, a 2-Fucosyllactose group, a 3-Fucosyllactose group, a Lacto-N-fucopentaose II group, a Lacto-N-difucohexaose I group, and a Lactodifucotetraose group or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc.

29. A synthetic nutrition composition comprising a purified protein modified to include at least two groups selected from: a Lacto-N-fucopentaose I group, a Lacto-N-fucopentaose II group, a 2-Fucosyllactose group, a 3-Fucosyllactose group, a Lacto-N-fucopentaose II group, a Lacto-N-difucohexaose I group, and a Lactodifucotetraose group or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc.

30. A synthetic nutrition composition comprising a purified protein modified to include at least two groups selected from:

Lacto-N-fucopentaose I;

Lacto-N-fucopentaose II;

3'-Fucosyllactose;

Lacto-N-fucopentaose II;

Lacto-N-difucohexaose I;

Lactodifucotetraose;

LactoN-tetraose;

LactoN-neotetraose;

3'-Sialyllactose;

3'-Sialyllactosamine;

6'-Sialyllactose;

6'-Sialyllactosamine;

Sialyllacto-N-neotetraose c;

Monosialyllacto-N-hexaose;

Disialyllacto-N-hexaose I;

Monosialyllacto-N-neohexaose I;

Monosialyllacto-N-neohexaose II

Disialyllacto-N-neohexaose

Disialyllacto-N-tetraose;

Disialyllacto -N-hexaose II;

Sialyllacto-N-tetraose a;

Disialyllacto-N-hexaose I;

Sialyllacto-N-tetraose b;

3'-Sialyl-3-fucosyllactose;

Disialomonofucosyllacto-N-neohexaose;

Monofucosylmonosialyllacto-N-octaose (sialyl Lea);

Sialyllacto-N-fucohexaose II;

Disialyllacto-N-fucopentaose II; and

Monofucosyldisialyllacto-N-tetraose or a variant thereof in which the Glc at the reducing end is replaced with GlcNAc wherein the at least groups are the same or different .

31. The composition of claim 30 wherein the protein is modified to include at least two different groups.

32. The synthetic nutritional composition of any of claims 21-29 further comprising an edible fat, a vitamin, a plant protein or an animal protein.

33. A method for treating or reducing the risk of infection, the method comprising administering the composition of any of the forgoing claims wherein said composition is not a mammalian milk.

34. The method of claim 33 wherein the composition comprises 2'FL or 2'FLNAc.

35. The method of claim 34 wherein the molecule comprises a protein to which 2'FL and/or 2'FLNAc are directly or indirectly covalently attached.

36. The method of claim 33 wherein the infection is caused by *V. cholerea* or *C. jejuni*.

37. The method of claim 33 wherein the infection in an enteric infection.

38. A method for reducing the risk of enteric disease in a patient, the method comprising,

(a) identifying the two most prevalent agents capable of causing enteric disease in the geographic location of the patient;

(b) administering to the patient a composition comprising a molecule comprising a first glycan which interferes with the binding to epithelial cells of the first of the two most prevalent agents and a second glycan which interferes with the binding to epithelial cells of the second of the two most prevalent agents wherein said composition is not breast milk.

39. A method for reducing the risk of enteric disease in a patient, the method comprising,

(a) identifying the two most prevalent agents capable of causing enteric disease in the geographic location of the patient;

(b) administering to the patient composition comprising

i) a first molecule comprising a first glycan which interferes with the binding to epithelial cells of the first of the two most prevalent agents; and

ii) a second molecule glycan which interferes with the binding to epithelial cells of the second of the two most prevalent agents;

wherein said composition is not breast milk.

40. A yeast cell harboring a recombinant vector comprising a nucleotide sequence encoding GDP-mannose 4, 6 dehydratase and a nucleotide sequence encoding GDP-L-fucose synthetase.

41. The yeast cell of claim 40 wherein the GDP-mannose 4, 6 dehydratase is *H. pylori* GDP-mannose 4, 6 dehydratase.

42. The yeast cell of claim 40 or claim 41 wherein the GDP-L-fucose synthetase is *H. pylori* GDP-L-fucose synthetase.

43. The yeast cell of any of claims 40-42 wherein the yeast cell harbors a nucleic acid molecule encoding a GDP-fucose/GMP antiporter fusion protein.

44. The yeast cell of any of claim 43 wherein the fusion protein comprises a golgi-membrane location sequence.

45. The yeast cell of claim 43 wherein the golgi-membrane location sequence is from Vrg4p.

46. An isolated nucleic acid molecule encoding a fusion protein comprising at least a first portion and a second portion, the first portion comprising the active domain of a GDP-fucose/GMP antiporter and the second portion comprising a golgi localization sequence.

47. The isolated nucleic molecule of claim 46 wherein the golgi localization sequence in a yeast golgi localization sequence.

48. A yeast harboring the isolated nucleic acid molecule of claim 46.

49. The yeast of claim 48 further harboring a nucleic acid molecule encoding a fucosyltransferase or a galactosyltransferase.

50. The yeast of claim 49 wherein the fucosyltransferase is selected from:
Homo sapiens fucosyltransferase 1 (galactoside 2-alpha-L-fucosyltransferase, Bombay phenotype included) (FUT1);
Homo sapiens fucosyltransferase 2 (secretor status included) (FUT2);
Homo sapiens fucosyltransferase 3 (galactoside 3(4)-L-fucosyltransferase, Lewis blood group included) (FUT3);
Homo sapiens fucosyltransferase 4 (alpha (1,3) fucosyltransferase, myeloid-specific) (FUT4);
Homo sapiens fucosyltransferase 5 (alpha (1,3) fucosyltransferase) (FUT5);

Homo sapiens fucosyltransferase 6 (alpha (1,3) fucosyltransferase) (FUT6);
Homo sapiens fucosyltransferase 7 (alpha (1,3) fucosyltransferase) (FUT7);
Homo sapiens fucosyltransferase 8 (alpha (1,6) fucosyltransferase) (FUT8);
Homo sapiens fucosyltransferase 9 (alpha (1,3) fucosyltransferase) (FUT9); and
Homo sapiens protein o-fucosyltransferase (POFUT1).

51. A pharmaceutical composition comprising a purified protein modified to include at least two different groups selected from LNT, LNneoT or a variant thereof wherein the Glc at the reducing end is replaced by GlcNAc.